DOCUMENT RESUME

ED 049 002 RE 003 416

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TITLE The Building Block Construct as a Possible Model for Decoding Processes.
PUB DATE Dec 70
NOTE 11p.; Paper presented at the National Reading Conference, St. Petersburg, Fla., Dec. 3-5, 1970

EDRS PRICE EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS Abstraction Levels, *Cognitive Processes, Comprehension Development, *Models, Readability, *Reading Comprehension, *Reading Processes, Syntax, *Theories

ABSTRACT

The building block theory of language structure, an information processing approach, is applied to the development of a model of the reading process. Specifically, the model is concerned with the amount of time an individual will spend reading and the amount of content he will decode which is determined by a series of cognitive processes involving some aspects of sampling, matching, switching, analysis of subjective probabilities, and analysis of syntax. According to the model, a person intending to read a communication message begins by evaluating the message on the basis of likelihood that it might be comprehensible, sensational, opinionated, etc. and uses that basis to make several hypotheses about the quality of the message. He then gathers information from the syntax of the message with which to evaluate his hypotheses. Once he has decided on the merits of an hypothesis, he continues reading until he has enough information to begin the process again. Several possible applications of this model for reading research are given. One suggests that since people often read only beginning and final paragraphs, the repositioning of important data might require shifting of reading emphasis. Another application might be in training individuals to look for higher levels of abstraction when they read. Research on the model is urged. References are included. (MS)

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THE BUILDING BLOCK CONSTRUCT AS A POSSIBLE MODEL FOR DECODING PROCESSES

U. S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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In previous papers, a building block theory of language was presented and some experimental evidence was provided on the validity (6,7). This theory holds that the linguistic attributes in a communication message are structured as building blocks corresponding to the level of abstraction of the communication performance concept they index. This theory may be used to select correlates in the development of measures for unindexed judgmental performance variables and to deduce concepts which may be available but not postulated for message correlate measures and both these possibilities have been mentioned in prior papers. A major implication of this theory -- one that has not been extensively explored -- is that the message correlates may operate to regulate switches which control the length of time spent in processing and reading a communication message. The present paper develops the notion of how these attributes may work for switching purposes in decoding activity -- a notion which is in keeping with information models of cognitive processes.

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Background

Various information models of cognitive process have been presented in the literature and some of these seem to be especially relevant to an understanding of

decoding processes (1, 3, 10, 12). The building block construct of language is one such information theory approach which may provide some indications about possible determinants of the amount of time an individual will spend reading and the amount of content he will read in a written communication. The particular thrust of this construct is not on what stimulates a reader to select a message to read -- although the building block construct may have interesting implications there -- but more upon what happens in the decoding process once a person starts reading that keep him attending to the reading of the message. Decoding activity as with other activities in cognitive processes will involve some aspects of sampling, matching, switching, analysis of subjective probabilities and analysis of syntax.

Sampling. When an individual performs a communication decoding activity such as reading a written message, this will involve among other things some aspect of sampling at at least two levels of decoding activity. Such a sampling notion is basic to models of concept formulation and evaluation proposed by Hull (4), Osgood (13) and Staats (14). The sampling will involve an abstracting both of information stored in memory and stimulus attributes of information input from a communication message. The degree of detail of the attributes available as communication input may vary, and some pre-sampling of detail has taken place at a time prior to the reading of a particular communication message. The level of absence of detail or abstraction in the message may influence how much sampling is necessary to obtain a representative information input about the communication message.

Matching. An information processing activity such as that in decoding of written messages will involve some aspects of matching of stimulus attributes of information input with the representations of the attributes in memory. Some writers in particular Bruner (3) have suggested that such matching may be

accomplished through hypothesis testing activity, and the availability of matching operations in cognitive processes have been suggested in writings of Newell, Shaw and Simon (12), Miller (9) and Miller and Chomsky (10). In matching, an individual forms a hypothesis about the category to which attributes of a stimulus object may be classified and a best fit match-mismatch decision is made regarding how the stimulus attributes compare with the representation of those attributes in the hypothesis.

In reading activity these hypotheses may be judgments about a message, that it is understandable, complete, sensational, enthusiastic, opinionated, tasteful and so on. The distinction between judgments of and about a communication is essentially the distinction between comprehension and comprehensibility of a message. The important point is that the hypotheses predict not that an individual will understand a message or for that matter find it completely sensational, enthusiastic or tasteful; only that he will find some indication from the stimulus attributes of the message that enable him to make a go-no-go decision based on the likelihood that a message will be comprehensible, sensational, enthusiastic, tasteful and so on.

Switches. Some information theory models have proposed that attention to information input is governed by a series of switches which operate as go-no-go decisions for processing purposes, e.g. Bruner (3) and Miller and Chomsky (10). Such switches if present, will likely operate to continue or stop reading activity. One basis for these decisions which may govern switching operations is the evaluation of the hypotheses about the quality of the communication. When an individual finds a best fit, matching between the stimulus input and the hypothesis about the likelihoods of comprehending, finding sensationalism or finding enthusiasm in the message, the switches are opened and reading continues; conversely if no fit is made with any of the switches, the switch remains closed and

reading activity is stopped.

Subjective Probability. For the switches to be activated some criterion is necessary for determining levels of acceptance or rejection of the various hypotheses. Some research has indicated that cognitive activities such as matching and switching may be governed by subjective probability estimates, e.g. Bowers (2) and Bruner (3). From the development of basic to more elaborate reading skills an individual will have a history in making decisions about the relative qualities of a message, its comprehensibility, likelihood of sensationalism, and so on. From having experienced communication input on various message attributes, the individual likely will form some type of subjective probability estimates about the quality of a message; and, this probability represents the probability of a quality given information input on some message attributes. Such subjective probability values may serve a dual role, both as a cut off point at which reading will stop or go on, and as weightings with which communication information input may be modified to provide estimates for evaluation of the categorical hypotheses.

Syntax. In some information theory models of cognitive processes language syntax plays an especially important role of binding together various bits of communication content information as chunks or blocks of semantic information content; e.g. Miller (9) Newell, Shaw and Simon (12). In other models, language syntax is believed to be the vehicle by which an individual generates rules for processing and storage of information, e.g. Bruner (3) and McNeil (8). In conducting the research on the validation of the building block construct, the possibility emerged that language syntax may also operate to provide information input which may be used to modify subjective probabilities on the quality of a message, and hence, to activate or leave inactive the various cognitive switches which determine the amount of time spent and content covered in reading activities.

How the Model Operates

When an individual starts to read a communication message he does so out of some more general motivation and in the context of conflicting activities which may at any point in reading activity lead to the stopping or postponement of reading. Aside from competing alternatives such as eating, sleeping and so on, there may be a number of attributes in the message which may lead to a termination of reading behavior at various points in the decoding process.

The present theoretical formulation proposes that the first step that an individual makes after he starts reading *a* communication is to evaluate a message on the basis of a number of judgmental quality criteria -- in terms of comprehensibility, likelihood of sensationalism, likelihood of enthusiasm and so on. As part of this evaluation, hypotheses are formed about the quality of the message -- that the message is in all likelihood sensational, enthusiastic or opinionated. These hypotheses are likely developed along with basic reading skills and are available to an individual at the outset of a reading activity.

A second step an individual makes in reading is to gather data with which to evaluate the hypotheses. This is accomplished in the present construct when an individual samples vis a vis abstracting aspects of syntax from the message. Such syntactic aspects or details will include attributes such as words, sentences, syllables, and parts of speech which may be obtained from a relatively gross surface parsing of the sampled message.

An actuarial count is made on such message attributes as words, sentences, adjectives and adverbs, and attribute frequencies or ratio estimates based on these frequency counts are used to evaluate the hypotheses. For example, an individual who forms a hypothesis about the comprehensibility of a passage, performs counts on a sampling of message content at one or more points in a message on

attributes such as words, sentences, and syllables; and from these, estimates the degree of comprehensibility of the message. From actuarial counts on message attributes in prior reading the individual has formed two sets of subjective probabilities. One set of subjective probability values operate as beta weightings in a conceptual regression analysis. The individual modifies his judgment of the comprehensibility of the passage with these subjective probability values in a manner similar to using a regression equation. A second set of subjective probability values, available from a priori regression analyses provide a cut off criterion value at the preferred level of comprehensibility. A matching is made between the expected value of each hypothesis and the estimate from the modified syntactic input. When the best fit criterion probability value is met, a switch is opened. For instance, when a hypothesis about comprehensibility is met at a criterion value, the individual adjudges the message as comprehensible and the switch to continue reading is opened.

Similarly actuarial counts on message attributes provide the input for decisions to activate the various switches and go-no-go decisions are made in reading for other judgmental qualities such as the communication performance concepts investigated in the validation of the building block construct. These were, comprehensibility, completeness, informativeness, sensationalism, enthusiasm, involvement, opinionation, human interest, tastefulness and creativeness. The estimates of degree of comprehensibility contribute to estimates of completeness and the estimate of completeness contributes to the estimate of informativeness, and so on with each estimate at a lower level contributing to the estimation of a judgmental quality at a higher level in the abstraction continuum.

Some or all quality criteria may be available to an individual for making decisions about communication information input. Either through disuse, or unavailability some individuals may be limited in the level of abstraction at

which they may make decisions. Some research has shown that an individual may not have criterion or standard for evaluation of creativeness in writing (9). In similar manner, there may be persons who are not able to make judgments about the tastefulness, or degree of opinionation in a message, and are limited to making reading decisions at a low level of abstraction.

The non-opening of a switch may not preclude the continuation of reading. For instance, an individual may feel that some material is low in comprehensibility but still attempt to read it in that it may be high in opinionation or creativeness. In effect the decision to go in a go-no-go decision on a variable at a higher level of abstraction may override the no-go decision at a lower level of abstraction. This will not be the most likely expectancy or the general rule since the correlates at lower levels become an incremental but not singular estimate of variables at higher levels of abstraction.

Some Applications

The present paper has presented a model for decoding processes which develops the idea that the length of time and amount of content covered in reading will be determined by a series of cognitive switches. The switches in this model are governed by subjective probability values determined by actuarial counts on language attribute data. Two sets of probability values are available at each level of abstraction, one for making decisions about switching, and one for modifying data from language input to produce estimates as to the quality on variables such as the comprehensibility and sensationalism in a message. In this construct, the linguistic attributes operate in a similar manner as in the building block theory, as correlates which provide estimates about judgmental quality criteria at various levels of abstraction.

No empirical evidence is presented in this paper, to support this theoretical formulation. The formulation represents a logical analysis based on what is known

about mechanisms which govern cognitive processes, and seemingly is in keeping with what research evidence has shown about how information is processed and stored in the decoding operation. As such, the formulation provides a testable series of postulates and it should be possible through subsequent research to validate this model of the decoding process.

An obvious application of this theoretical construct is to subsequent research in reading. Hopefully this rationale will encourage research on identification of concepts which may inhibit--or facilitate--switching operations, and will more or less directly affect the continuation or cessation of reading activity. Along these lines, there is considerable evidence from readability studies that persons rarely read more than the first two paragraphs of a news story, and in reading novels, it is generally believed that individuals tend to read only the beginnings and the endings--a procedure which seemingly is common among readers of the research literature. Once the attributes which may be relevant to switching are identified, material can be edited to manipulate switching behavior.

A second and no less important application is the possibility that individuals may be trained to make greater use of switches at higher levels of abstraction, and in so doing, cultivate their levels of educational and cultural development. For instance, once attribute correlates of judgmental qualities are identified, an individual can be trained to look for these attributes. Given some weightings with which to make decisions about the relative importance and contribution to estimation of criterion qualities of each of the attributes, it should be possible for that person to make judgments at higher levels of abstraction than is presently possible. In addition, some level of sensitivity training may be desirable in encouraging persons to use criteria at higher levels of abstraction where such criteria are available but suffer from disuse.

This model represents one step in what seemingly is an intriguing area of reading research. Hopefully, the presentation of this idea will stimulate others to do research on this rationale, but not prescribe it as an avenue of attack for all researchers. The actuarial accounting argument may be more or less over simplified, and some analysis and elaboration in terms of transformation may be necessary to develop the explanatory power of this construct. The theoretical construct seemingly proceeds in a logical manner and appears to explain an aspect of reading behavior in a reasonable way, however, the test of its validity--the proof of the pudding--remains for further research.

REFERENCES

1. Berlyne, David E. Conflict Arousal and Curiosity, New York: McGraw-Hill (1960).
2. Bowers, Gordon H. "Organization and Memory," Paper presented at the Western Psychological Association Meeting, San Diego, California, April 1968.
3. Bruner, Jerome S. "Information Processing Approach to Cognition," in Harper, Robert J. D. et.al. (Ed.) The Cognitive Processes. Englewood Cliffs: Prentice Hall, 1965. pp. 225-256.
4. Hull, Clark L. "Quantitative Aspects of the Evaluation of Concepts." Psychology Monographs. 28:1, 1920.
5. Lynch, Mervin D. "Creativeness: Its Meaning and Measurement." Paper presented at the International Reading Association Meeting Kansas City, Mo. April 1969.
6. Lynch, Mervin D., Kaufman, Maurice and Rentel, Victor, "An Experimental Validation of the Building Block Construct." Paper presented at the National Reading Conference, St. Petersburg, Florida, December, 1970.
7. Lynch, Mervin D., Rentel, Victor and Kaufman, Maurice. "Abstraction and its Role in the Building Block Construct." Paper presented at the National Reading Conference, St. Petersburg, Florida December, 1970.
8. McNeil, David. Developmental Psycholinguistics. Mimeo. Center for Cognitive Studies, Harvard University, 1966.
9. Miller, George A. The Psychology of Communication. New York: Basic Books, 1967.
10. Miller, George A. and Chomsky, N. "Finitary Models of Language Users." In R. D. Luce, R. R. Bush and E. Galanter (Eds.) Handbook of Mathematical Psychology. Vol. 2. New York: Wiley pp. 419-492.
11. Neisser, Ulric. Cognitive Psychology. New York: Appleton-Century Crofts, 1966.

12. Newell, Allen, Shaw, J. C. and Simon, Herbert A. "Elements of a Theory of Human Problem Solving." In Harper, Robert J. C. et.al. (Eds.) The Cognitive Processes. Englewood Cliffs: Prentice Hall, 1965. pp. 339-356.

13. Osgood, Charles E. "A Behavioristic Analysis of Perception and Language as Cognitive Phenomena." In Harper, Robert J. C. et.al. (Eds.) The Cognitive Processes. Englewood Cliffs: Prentice Hall, 1965. pp. 189-210.

14. Staats, Arthur W. 'Verbal Habit Families, Concepts and the Operant Conditioning of Word Classes." In Harper, Robert J. C. et.al. (Eds.) The Cognitive Processes. Englewood Cliffs: Prentice Hall, 1965. pp. 161-176.